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National Program of Research for

FOREIGN AGRICULTURAL TRADE AND ECONOMIC DEVELOPMENT

Prepared by

**A JOINT TASK FORCE OF THE
U. S. DEPARTMENT OF AGRICULTURE
AND THE STATE UNIVERSITIES
AND LAND GRANT COLLEGES**

FOREWORD

The United States Department of Agriculture and State Agricultural Experiment Stations are continuing comprehensive planning of research. This report is a part of this joint research planning and was prepared under recommendation 2 (page 204, paragraph 3) of the National Program of Research for Agriculture.

The task force which developed the report was requested to express their collective judgment as individual scientists and research administrators in regard to the research questions that need to be answered, the evaluation of present research efforts, and changes in research programs to meet present and future needs. The task force was asked to use the National Program of Research for Agriculture as a basis for their recommendation. However, in recognition of changing research needs it was anticipated that the task force recommendations might deviate from the specific plans of the National Program. These deviations are identified in the report along with appropriate reasons for change.

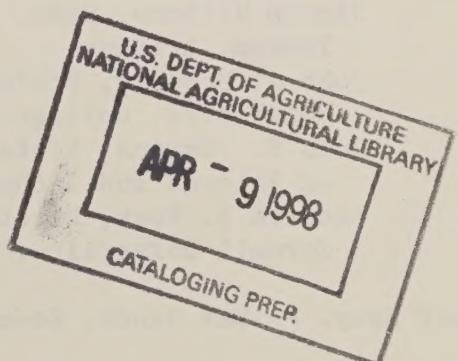
The report represents a valuable contribution to research plans for agriculture. It will be utilized by the Department and the State Agricultural Experiment Stations in developing their research programs. It should not be regarded as a request for the appropriation of funds or as a proposed rate at which funds will be requested to implement the research program.

This report has been prepared in limited numbers. Persons having a special interest in the development of public research and related programs may request copies from the Research Program Development and Evaluation Staff, Room 318-E Administration Bldg., USDA, Washington, D.C. 20250.

February 1969

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PREFACE

Background

The long-range study, "A National Program of Research for Agriculture," conducted by a joint USDA-SAES Task Force, was published in October 1966. The second recommendation of the study called for a more systematic and continuing mechanism that would facilitate joint research program planning, evaluation, and coordination. The Agricultural Research Planning Committee at its July and December 1966 meetings recommended the establishment of task forces to develop coordinated State-Federal plans for specified areas of research. Subsequently, thirty-two task forces were established of which this is one.

Authority

The Joint Task Force on Foreign Agricultural Trade and Economic Development was established by memoranda of Dr. George L. Mehren, Assistant Secretary of Agriculture, and Dr. A. G. Hazen, Chairman of the Experiment Station Committee on Organization and Policy, dated April 8, 1968.

Membership

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Assignment

The package assignment to this task force includes all three research problem areas in Goal VI of the National Program of Research for Agriculture, which is to: "Expand Exports and Assist Developing Countries."

SUMMARY

American agriculture is playing an expanding role in international agricultural affairs. The United States is the largest world exporter of agricultural products and only the United Kingdom imports more agricultural products.

The United States also is the largest world exporter of farm products under food aid programs. Food aid programs have had objectives of helping developing countries develop economically and expand commercial markets for farm products. About 40 percent of the economic aid supplied by the U.S. to developing countries is food aid.

U.S. educational institutions, especially the land-grant colleges, have become increasingly involved in assisting the developing countries improve their agriculture and overall economic growth. Technical assistance and food aid programs have humanitarian, political, and social as well as economic objectives. As the low-income countries achieve economic growth, they become better trading partners. Agriculture including forestry is the dominant sector in the developing countries and national economic growth in most of these countries depends heavily upon improved agricultural production and marketing.

The USDA and SAES have research programs concerned with RPA 601, "Foreign Agricultural Trade," under which developments abroad affecting commercial markets for U.S. farm products are analyzed. However, programs of research in this area vary widely among states. In 1966 approximately 90 scientist-man-years (SMY) were devoted to research on effects of foreign agricultural production, consumption, prices and trade on U.S. agricultural trade. However, research inputs in this area are much too small. Research programs in this area need to be doubled in the next 10 years.

The USDA and SAES have done relatively little research on economic aspects of food aid programs. In 1966 the USDA devoted only 2 SMY's to RPA 602, "Food Aid Research." No SAES researchers spent full time on such research. The Agricultural Trade Development and Assistance Act of 1954 (Public Law 480) was extended in 1966 and again in 1968 and amended to include self-help provisions. To qualify for U.S. food aid, developing countries must now provide evidence that they are taking actions to increase the efficiency of their agricultural sectors. Research is urgently needed to provide information on which to base U.S. food aid policies and carry out effective programs. Research in this area needs to increase to 50 SMY's over the next 10 years.

The USDA and SAES devoted approximately 27 SMY's to research on RPA 603, "Foreign Agricultural Development," in 1966. This estimate includes only those devoting full time to research on agricultural development of the low-income countries. It does not include USDA and university staff engaged in technical assistance and development of educational institutions that train agricultural and forestry scientists abroad. USDA and SAES research in this area must be increased to at least 600 SMY's in the next 10 years. This

expansion, of course, will not be adequate for all of the needed research on agricultural and forestry development problems in the low-income countries. A major U.S. role is to help the developing countries build their own capacity to do research needed to develop agricultural and forestry industries.

U.S. research on agricultural development of low-income countries now is financed almost entirely by funds transferred from AID. USDA and SAES receive no support for work in this area through direct appropriations. However, direct financial support for research in this area is authorized (but no funds have been appropriated) under section 406 of P.L. 480, as amended in P.L. 89-808. Also, Section 104(k) of P.L. 480 has been used to finance some USDA-sponsored research abroad.

INTRODUCTION

There was no question among members of this task force about the need for international research on foreign agricultural trade and economic development problems. Its contribution can range all the way from forceful and direct application for international traders to remote and indirect influence on individuals throughout the world. The increased movement of goods in world markets since World War II has contributed in many ways to worldwide growth in economic activity and the general welfare. As part of this worldwide movement of goods and services, agriculture has much at stake. For every dollar's worth of competitive agricultural commodities imported, American farmer's export products amounted to \$2.50.

Within such a far-reaching and important field of subject matter there are conditions and influences which transcend the area considered by the task force, but which exert influences on the nature of the research, how it is funded, how it is carried out, and how it is reported and finally acted upon. Because the assignment to this task force was limited to the agricultural aspects of foreign trade and economic development, it was felt that some of the most important considerations need to be pointed out in the hope that administrators and legislators might find ways of dealing with policy matters that vitally affect the research program.

There are basic problems of organization, direction and funding of international research. Much experience has been gained since World War II from a variety of activities by governments, institutions, councils, foundations, welfare groups and international agencies. There is a serious need to bring about effective leadership among all these efforts. More specific needs include clarification of (1) the federal role, (2) the SAES role, (3) communication, liaison, and coordination, and (4) relationships between sources of funds and capacity to perform research.

Physical and biological scientists involved in agricultural development abroad often are limited by social and political restraints which are difficult to evaluate or overcome. Greater involvement of the social sciences on these problem areas gives promise of more fruitful work in all fields.

Another important consideration pertains to U.S. foreign trade policy involving agricultural products. Well directed research is needed and can contribute the economic intelligence required for reevaluation and development of foreign trade policy.

U.S. Interest in Foreign Agricultural Affairs

American farmers have a major economic interest in foreign markets for agricultural products. In 1967 the output from about 71 million acres, nearly one-fourth of the total acreage harvested, was exported. U.S. agricultural exports have increased from about \$4 billion a year in the late 1950's to

\$6.7 billion in 1967. Commercial exports of U.S. farm products annually have increased in value from \$2.8 billion in the late 1950's to \$5.2 billion in the last three years. Exports under Government programs have averaged close to \$1.6 billion a year since the late 1950's

U.S. agriculture has the production capacity to expand exports substantially. Larger exports of farm products would improve farm incomes and the U.S. balance-of-payments position. The deficit in the U.S. balance-of-payments position would have been much larger if the expanded agricultural imports had not increased foreign exchange earnings in the last decade.

To maintain and expand U.S. agricultural exports will require a broad program of research on conditions affecting the marketing and the competitive position of our farm products in foreign markets. Economic developments in foreign countries need to be appraised to indicate U.S. export opportunities. Information concerning policies and programs of foreign countries affecting tariffs and other trade barriers must be compiled and analyzed for use in formulating and carrying out U.S. agricultural trade policies and programs.

Rapidly changing domestic and international supply and demand conditions for individual products require some flexibility in our own trade policies. It is essential to analyze current policy in detail to determine inconsistencies or inflexibilities which inhibit maximization of agricultural trade and development. Domestic production and price policies must be coordinated with our foreign trade policies to insure availability of appropriate quantities and qualities of products at competitive prices.

Growth of export markets for U.S. farm and other products depends upon economic development and income growth abroad. As foreign countries develop and incomes rise, they can import more and become better trading partners and larger markets for U.S. farm products.

Analysis of our imports and import policies is required to provide guidance to these trading partners. They will anticipate expanded U.S. markets if they buy more from us. Substantial knowledge of our future import position is difficult to determine because of its flexible nature.

The major dollar markets for U.S. agricultural exports are the high-income countries where agricultural development is relatively advanced. The less-developed countries have about two-thirds of world population but must achieve economic development and higher incomes if they are to become better trading partners and major dollar markets for U.S. farm products. Japan, Taiwan, Israel, Greece, and Spain are examples of countries that formerly were large recipients of U.S. food aid. In recent years, all have expanded their economies and become important dollar markets for U.S. farm products and other products.

Success in agricultural development creates new problems. In the smaller countries, substantial increases in marketable products may go beyond the capacities of the existing system to market, store, or finance. In the

larger countries, success may result in competition in world trade for the United States for products such as cotton and grains. Each country provides somewhat different research problems and technological advances, such as the new wheat and rice varieties can change a country picture quickly.

Economic development of the low-income countries depends heavily upon improvement of their agriculture. In many of these countries, 70 percent or more of the total population depend upon farming for a living. Higher levels of productivity in agriculture are needed in these countries to provide capital and man-power for industrial growth. At present, many countries produce little or no surplus; thus they have little saving and little domestic capital.

The United States has humanitarian, social, and political as well as economic objectives in international agricultural affairs. More abundant supplies of food and fiber are essential for political and social progress in the less-developed countries. In many areas, famine is still imminent as it has been for generations.

Urgency of the World Food Situation

In a world where communication and transportation increase the awareness of differences in economic and living conditions, abundant food supplies probably cannot and must not be the privilege of only a few nations. Furthermore, with the fast growing world population, a few developed countries cannot adequately feed the peoples of the world. It is essential that all potential agricultural areas be developed and used so as to produce efficiently on a long-run basis.

The challenge is primarily to the United States (which has the most to offer and the most to lose). The U.S. can help underdeveloped countries build their agricultural sectors to make full use of their potential in meeting domestic food needs and to provide products for increased international trade. Already significant progress has been made in developing improved food crop varieties for use in tropical countries. The Mexican wheats, the improved rice (IR-8) selections and high producing corn selections that have come from the Rockefeller and Ford Foundations' research programs are producing notable food increases. These point a way; much more remains to be done, not only in the development of new inputs but in their cultural management to achieve full benefit of their potential.

Three separate articles in BioScience, Vol. 18, July 1968, deal with the problems of growing population, increased demands on resources, and the threats of man's activities to the environment. One of the articles points out that several past civilizations that had productive agriculture now cannot support even limited populations. Water logging of the soil, the buildup of salinity, the depletion of water supplies, and soil erosion ruined agriculture.

The challenge, then, is to produce food on all potential productive land while protecting essential resources against deterioration. According to E.J. Arther, even man's best efforts may be insufficient to meet the food demands

of the future. He talks of the high probability of famine: "We must recognize that the world's population may have already exceeded the allowable limits and finally that if man is going to live in an environment of high quality, he must learn to be part of his environment--interacting with it and not just consuming and in some cases destroying it." He concludes his article raising the question: "Are we willing to prepare for famine?"

R. L. Predmore also writes about the problems of averting famines. He states: "Chiefly political and moral difficulties are to blame; i.e., our ability to persuade enough of the right people to set the right priorities and prepare to face the punishing costs before it is too late." He adds: "This is what stands in the way of curing most of our ills."

Programs for Agricultural Development

The principal aim in aiding developing nations must be to help them help themselves. U.S. research and education techniques can be a major contribution toward this goal. Food deficit countries vary greatly in their supply of agriculturally educated people with which to staff research and extension education programs. They also vary in the extent to which they have institutions and organizational structures to operate such programs. Consequently, initial effort and emphasis must be on assisting the in-country educational institutions. In the meantime, arrangements should be made to send qualified students to developed countries to obtain advanced degrees in the agricultural sciences.

The agricultural faculties of in-country universities and ministries of agriculture must be guided and helped to make effective use of agricultural graduates in conducting appropriate research and extension programs that identify and solve agricultural problems associated with transforming traditional, subsistence agriculture to a modern productive, commercial agriculture.

Finally, these countries must be aided in conceiving and operating research and extension programs. Such programs are rudimentary in some countries and virtually non-existent in others. Most generally, their effective operation is lacking. So once the corps of educated agriculturists begins to grow and the organizational structures are provided, the actual operation will need guidance over a period of time until competence is acquired. In these aspects of building the agricultural productivity, the USDA and the SAES can provide most effective aid. In doing this the need is for sound, long-range goals plus reliable funding to permit scientists to serve developing countries and yet not handicap their future at home nor diminish the U.S. programs.

Organization for Research

A research program to aid in the development of countries and to increase international trade has many facets. Some research has been and must continue to be done in the United States. A real service can be performed by research centers such as those operated by the Rockefeller and Ford Foundations serving groups of similar countries, but in-country adaptive research must be initiated in each country. The U.S. Department of Agriculture and the State

agricultural experiment stations have the necessary experience, the crucial corps of scientists, and other competence to provide a base for a program of research to develop the agricultural potential of these countries.

Competent scientists work best when affiliated with research-oriented organizations. The problem-solving research needed calls for multiple-discipline competencies and team efforts. Scientists isolated by organization or by country cannot be fully effective in conducting the coordinated long-range programs necessary to achieve the desired results. Furthermore, all experiment station scientists and many U.S. Department of Agriculture scientists are directly or closely associated with colleges of agriculture and graduate schools. This affiliation facilitates the supervision of research by foreign graduate students and by domestic graduate students interested in helping develop foreign agriculture. Therefore, it is recommended that these research resources be built upon as the most effective means for providing the essential knowledge and techniques for developing agricultural resources of the world and safeguarding the use of these resources to maintain long-range production.

The magnitude of the job is such that cooperative programs to provide financial support, scientific competence, and organizational know-how will be needed. The U.S. Government through AID, the Department of Agriculture, the State Department, and the Commerce Department, is the logical working partner with the land-grant universities and agricultural experiment stations to supply financial support, professional guidance and program organization. The private Foundations also have resources for carrying out programs that can and should be coordinated with public programs.

While much research will have to be done by U.S. affiliated scientists, the aim must be to get in-country scientists engaged in research as rapidly as possible. This requires some accelerated programs to train scientists and especially social scientists. Social and cultural barriers to agricultural development are particularly important in the lesser developed countries. A large and integral part of any research effort must be that of the social scientist. Ultimately, policy questions will determine success or failure in many countries so special attention must be paid to these questions in their individual social, political, and economic contexts.

Organization of this Report

This report treats three distinct, yet related aspects of agricultural international relations: (1) foreign agricultural trade, (2) food aid, and (3) foreign agricultural development. The U.S. can and does ship food and other products to many nations. Much of the food moving to the underdeveloped nations is currently subsidized. It is of mutual benefit, but it is not a permanent solution to the world food situation. The full potential for international trade can develop only as the countries develop both their agriculture and their industry to the point of having available for export those goods which they can produce most efficiently.

An effective mechanism must be created whereby research programs can be expanded in this country and in individual developing countries to solve the problems of agricultural development and to build and maintain a sound international trade. The following sections of this report elaborate on the more specific research programs considered essential for accomplishing this mission.

JOINT TASK FORCE ON FOREIGN AGRICULTURAL TRADE AND ECONOMIC DEVELOPMENT
 Summary of Inventory and Recommended SMY's

Research Problem Areas	1966 <u>1/</u>			1972			1977		
	SAES	USDA	TOTAL	SAES	USDA	TOTAL	SAES	USDA	TOTAL
	:	:	:	:	:	:	:	:	:
601 Foreign Agricultural Trade	12	79	91	25	138	163	29	160	189
602 Food Aid Research		2	2	3	32	35	5	45	50
603 Foreign Agricultural Development	4	23	27	230	249	479	305	324	629
<u>TOTAL</u>	<u>16</u>	<u>104</u>	<u>120</u>	<u>258</u>	<u>419</u>	<u>677</u>	<u>339</u>	<u>529</u>	<u>868</u>

1/ Inventory of Agricultural Research, Volume I, Table I, June 1967.

FOREIGN AGRICULTURAL TRADE, RPA 601

A. National Needs for Research

Agricultural exports are vital to the economy of the U.S. U.S. agricultural exports have made a major contribution to the U.S. balance-of-payments. The U.S. is the world's biggest exporter of agricultural products. It is also a close second to the U.K. in agricultural imports. Thus, the U.S. market is very important to the economy of many foreign countries that depend heavily on exporting agricultural products. The U.S. supplies one-fifth of world exports and takes one-sixth of the imports. U.S. products go to over 125 countries and territories. The total value of U.S. agricultural exports has averaged over \$6 billion annually in recent years, and reached a record \$6.8 billion in fiscal 1967. The products of one-fourth of the acres harvested in the U.S. are exported. The share of exports in total U.S. sales of farm products by commodity was (FY 1967):

Wheat	56 percent
Rice	67 percent
Cotton	48 percent
Tobacco	34 percent
Soybeans	37 percent
Sorghum	39 percent

The increasing importance of agricultural exports makes it essential to develop better estimates of export prospects. U.S. agricultural policies and programs must be adapted to realistic evaluations of the outlook for exports. Because a large and increasing proportion of total farm output now moves abroad, changes in foreign markets will affect domestic prices for farm products and incomes of American farmers significantly.

There is need for development of techniques and equipment to reduce costs of moving U.S. agricultural commodities to overseas markets and for providing and maintaining the product quality desired in export markets. If U.S. agricultural commodities are to compete in these markets, they must be equal or better in quality and as cheap as those from other countries. There is increasing evidence that this is not true of cereal grains, fresh fruits and animal products. Because of lack of development or application of new technologies for handling, storage, and transportation, some U.S. exported commodities are less acceptable than similar products from competing countries. Insect infestation, pesticide residues, inadequate grade standards, and poor condition of products often adversely affect export sales. These problems are amenable to solution through expanded biological and physical research

B. Current Program

In FY-1966, USDA devoted 79 SMY's to export market development research. The research inputs by SAES were probably about 12 SMY's. Research on foreign agricultural trade includes a variety of studies:

- (1) Appraisal of the current food and agricultural situation in foreign countries and the short-run outlook for the demand and supply of farm products. This work includes the preparation of annual World and Regional Agricultural Situation Reports covering all the countries important in world agricultural trade. Indices of agricultural and food production on a total and per capita basis are prepared annually for these countries.
- (2) Analysis of policies of foreign governments designed to protect agriculture, encourage trade, and support prices and income of agricultural producers. This analysis is useful to U.S. policy-makers, trade negotiators, exporters and commodity groups.
- (3) Compilation of data on world production of and trade in agricultural commodities. Data are maintained for commodity groups in a program of continuing commodity analysis relating to foreign market demand and world food and fiber needs. Such data supply the basis for projection studies estimating future exports. Annual projections five years ahead are made of exports of leading U.S. agricultural commodities.
- (4) Periodic projections of exports for longer periods into the future. These projections are built on long-term projections of foreign supply and demand. This analysis involves contracting with competent research organizations for comprehensive country studies to analyze and project ahead, 10 to 15 years, the import demands and export availability of agricultural products. This research is used in projections and special studies of major regions and the world. The research within foreign countries is done by contractors who are paid with foreign currency generated from exports under P.L. 480.
- (5) Periodic preparation of food balances to assess the size and quality of food supplies. This work provides a basis for evaluating trends in the world food situation and progress of the less developed countries in solving their food problems. Agricultural developments in the less developed countries, particularly as they relate to requirements for food are analyzed regularly.
- (6) Analysis of foreign countries' financial positions and trade trends, and their effects on foreign trade. These are useful in evaluating countries' needs for aid and ability to shift from P.L. 480 to commercial imports.

- (7) Projections of world prospects for exports of less developed countries. This analysis will provide a basis for evaluating the agricultural development and trade programs of developing countries.
- (8) Appraisal of agricultural export and market development programs to provide a sound basis for their operation and improvement.
- (9) Continuous analyses of the development of regional economic organizations and their effects on U.S. agricultural trade.
- (10) Preparation and publication of statistical data on quarterly and annual agricultural exports and imports of the major trading countries.
- (11) Analysis of world agricultural prices for policy-makers, trade and agricultural program administrators, exporters and commodity groups.
- (12) Research on techniques and equipment to reduce the cost of moving U.S. agricultural commodities to overseas markets. Emphasis is on providing and maintaining product quality desired in export markets.

C. Recommended Programs

Although a substantial research effort has been underway on some aspects of this program area, the past inputs will be inadequate for future programs because of increasing complexity and significance of the problems. Estimates of SMY's required for an effective program are:

	<u>FY-1966</u>	<u>FY-1972</u>	<u>FY-1977</u>
USDA	79	138	160
SAES	<u>12</u>	<u>25</u>	<u>29</u>
Total	91	163	189

Some problems needing more research are:

- (1) Current situation and short-run production and trade outlook in foreign areas. The timely evaluation of current agricultural situations is important to policy-makers, traders, and U.S. agricultural interests. More adequate reporting and analysis of crop conditions, harvests, changes in trade barriers, foreign exchange problems, etc., are needed.
- (2) East-West trade. This subject is very likely to be of increasing policy interest in the future. A thorough evaluation of the significance for agricultural trade of changes in trade policies is required.

- (3) Trade concessions to less developed countries. The less developed countries have asked for special preferential treatment of their exports. The implications of such preferences for trade in agricultural commodities should be carefully evaluated.
- (4) Commodity agreements. As a basis for sound U.S. trade policies, a thorough evaluation of the experience, limitations and potentials of commodity agreements for trade in agricultural commodities should be made.
- (5) Balance-of-payments and international monetary system in relation to trade prospects. The limitation on trade in agricultural products arising from balance-of-payment problems, and the implications for agricultural trade of recent and proposed modifications in the international monetary and payments system should be evaluated.
- (6) Agricultural and trade policies of foreign countries.
 - (a) Nontariff trade barriers. In some cases nontariff trade barriers present greater obstacles to increased trade than do tariffs. However, relatively little evaluation of the trade impact of non-tariff trade barriers has been conducted.
 - (b) Common markets and other preferential arrangements. The increasing importance of common markets and other preferential trade arrangements establishes new important elements in world trading. The development of such markets must be evaluated continuously.
 - (c) Internal agricultural support systems. Throughout the developed world, governments support agriculture. Although the level and type of support vary among nations, most discriminate against imports in favor of domestic agriculture.
- (7) Effectiveness of market development and promotion. Research should be expanded to provide a better basis for planning market development and promotion programs. Such programs should be evaluated by concurrent and subsequent research. There is need for research evaluating the effectiveness of alternative market development activities.
- (8) Research should be undertaken on the various organizations engaged in market development and promotion and the strength and weaknesses of various approaches. For example, it would be worthwhile to evaluate the appropriate function of FAS, Co-ops, commodity associations, manufacturers, etc., in market development and promotion.
- (9) More study is required of U.S. potential exports. This study should estimate U.S. potential supplies of commodities for export, taking into consideration cost of production and comparative advantage of U.S. agriculture.

- (10) Transportation, storage, processing. Expanded research is necessary on types and costs of transportation, storage facilities and processing industries essential to marketing in foreign countries.
- (11) Increasing urbanization. The impact of increased urbanization on market structures and the demand for agricultural products in foreign countries has received little attention and should be studied much more thoroughly.
- (12) Research is needed to reduce costs and improve the delivered quality of exported agricultural products by development of more rigid and objective grade standards; improved and nonchemical methods of controlling insect infestation; new and improved methods, shipping containers, precooling, transit refrigeration and product conditioning facilities and services; and less costly, more effective methods of distribution in the foreign markets. Research on the following problems is especially needed:
 - (a) Develop improved bases for quality definition and standardization, primarily through instrumentation and techniques for objective measurement of quality.
 - (b) Develop methods to control insect infestation in cereals, oil-seeds, tobacco and dried fruits, with low-toxicity chemicals, sex attractants, irradiation, heat, refrigeration, and insect-resistant packaging.
 - (c) Develop new or improved methods and materials to control post-harvest decay in fresh fruits and vegetables; reduce physical damage to products; prevent mold and mycotoxins in peanuts and corn; and stop micro-biological spoilage in animal products.
 - (d) Develop new or improved and cheaper facilities and services for refrigerated transport of fresh fruits, vegetables, and animal products.
 - (e) Develop new or improved and less costly facilities and services for bulk transport of cereal grains, corn and soybeans.
 - (f) Develop new or improved and more efficient methods of handling perishable commodities after arrival in foreign markets.
 - (g) Establish foreign market quality laboratories in western Europe and in the Orient to identify causes of losses in U.S. agricultural exports and do research to lower costs, reduce loss, and improve market quality.

D. Relation to Other Research Programs

Research in this problem area is closely related to that under 602, Food Aid Research, and 603, Foreign Agricultural Development. In evaluating prospects for expansion of foreign agricultural trade, both short-run and long-run impacts of food aid and technical assistance must be considered. Much of the information essential for analysis of the outlook for trade is relevant to analysis of food aid and technical assistance programs.

Research on this problem is also relevant to 506 (U.S.) Supply, Demand and Price Analysis, because foreign areas provide both demand for U.S. farm products and competition with them.

E. Organization of Research

The USDA probably will continue to be largely responsible for collection of current information and preparation of short-run outlook analysis. The needs for speed and comprehensiveness of coverage require an organization large enough to quickly gather, process, analyze and communicate around the world. In addition, confidential research directly supporting government policy, such as some aspects of trade negotiations, will probably continue to be primarily the responsibility of USDA.

For most other kinds of research, there are a wide variety of possible assignments and sharing of responsibilities as between USDA and SAES. Perhaps a consortium of USDA and State Experiment Stations could effectively study imports. The States might concentrate on commodities competing with producers in their states. Contracts and co-operative agreements between USDA and SAES, contracts with other government agencies, contracts with foreign research organizations (using P.L. 480 funds), and contracts or cooperation with commodity organizations have all been used in the past and will continue to be used to accomplish work on international trade. Coordination and cooperation with AID, the Department of Commerce, the Department of State and certain foundations interested in trade, aid, and development will continue to be essential.

FOOD AID RESEARCH, RPA 602

A. National Research Needs

Since 1954, the United States has exported about \$1.6 billion worth of farm products annually under food aid programs to developing countries. Some of these exports were to countries whose domestic production is inadequate to meet growing requirements. Other exports were to nations that did not have enough foreign exchange for larger commercial imports.

Early food aid programs between 1954 and 1965 were concerned chiefly with surplus disposal and foreign market development for U.S. farm products. However, these programs were altered by amendments in 1966 and 1968. Food aid now emphasizes improvement of agricultural production and marketing in low-income countries in addition to foreign market development and improvement of nutrition.

The basic food aid legislation of the United States, the Agricultural Trade Development and Assistance Act of 1954, Public Law 480, was extended in 1966 and again in 1968 and amended to include the following provisions:

- (1) Removal of "surplus" requirement. U.S. food aid can be made up of commodities that are available or that can be produced, not only those in surplus as formerly was the case.
- (2) Emphasis on self-help. To qualify for U.S. food aid, developing countries must provide evidence that they are trying conscientiously--through self-help--to provide more of their own food requirements from their own resources and efforts.
- (3) Transition to dollar sales. The new program sets a time goal, the end of 1971, for countries now receiving U.S. farm products to buy such products for dollars, or with dollar credits.
- (4) Nutrition improvement. Additional stress was placed, especially in donation programs, on food for children.
- (5) Technical assistance. Food to meet current needs and technical assistance to help a country meet its future food needs were more closely related. Where countries show willingness to give high priority to production improvement, the U.S. will reinforce such self-help efforts with technical and scientific support from the Department of Agriculture, land-grant universities, and private agricultural entities.

P.L. 480 as amended in 1966 and extended in 1968 requires that information be available concerning:

- (1) Kinds of products the U.S. can supply under food aid programs and relative costs per unit of food nutrient.
- (2) Self-help measures that recipient countries can take to improve the production and marketing of agricultural commodities.
- (3) Possibilities for shifting from buying U.S. agricultural products with local currencies to buying them with dollars or dollar credits.
- (4) Nutritional deficits and kinds of food products needed to improve nutrition.
- (5) Kinds of technical assistance U.S. institutions can provide to improve agricultural production and marketing in developing countries.

In addition, there are questions concerning how food aid imports may affect economic incentives to expand agricultural production in recipient countries and the effects of food aid shipments on both commercial and food aid exports of other countries.

Food aid exports currently require the production from 15 to 20 million harvested acres in the United States. Therefore, it is especially important that both kind and amount of projected food aid and other food exports be estimated so future demands on U.S. agricultural resources can be projected.

In addition to research needed to implement P.L. 480, new food aid policies geared more to the food needs of developing nations should be studied.

B. Current Program

In FY-1966, USDA devoted 2 SMY's to research on economic effects of P.L. 480 programs on farm production and prices in recipient countries, the financial impacts of alternative P.L. 480 concessional sales programs upon external finances of recipient countries, costs and acceptability of selected alternative prepared food products for food aid programs, food consumption, and dietary deficits in developing countries. Research inputs in this area by SAES are not known precisely; but probably they did not total more than the equivalent of 2 SMY's in FY-1966.

Section 406 of P.L. 480 as amended in 1966 and extended in 1968 authorizes the U.S. Department of Agriculture to enter into contracts and conduct research in tropical and subtropical agriculture, and to provide technical assistance on agricultural development problems relating to food aid in developing countries. However, no funds have been appropriated under this authority.

Under the new International Grains Agreement, the U.S. and other developed countries will supply food aid to developing countries. This agreement increases needs for information on impacts of food aid on economic development of the poor nations.

Under contract, ERS-USDA has made comprehensive studies of the impacts of P.L. 480 foreign currency sales programs on agricultural output and prices, economic development, and patterns of international trade in Israel, Colombia, India, Turkey, Greece and Spain. A report summarizing the findings of these studies is being prepared by ERS, USDA.

The Center for Agricultural and Economic Development at Iowa State University and certain agricultural experiment stations, have studied both food needs and food production potentials in selected less developed countries. Several studies of food aid have been made by graduate students at U.S. universities.

The Interregional Committee on Agricultural Policy, SAES-USDA, sponsored three publications concerning the economic aspects of food aid programs in 1962-64.

The Food and Agriculture Organization of the United Nations sponsored five published studies relating to food aid programs in 1963-65.

C. Recommended Research Program

Research inputs have been inadequate to provide the information required in carrying out food aid policies and programs. Estimates of SMY's required to carry out an effective program are:

	<u>FY-1966</u>	<u>FY-1972</u>	<u>FY-1977</u>
USDA	2	32	45
SAES	--	3	5
Total	2	35	50

The estimates indicated above for 1966 do not include international monetary and financial analyses conducted by the USDA for use in preparing sales agreements under P.L. 480.

Problem areas in which research is recommended are described below.

- (1) Role of food aid relative to other kinds of economic and technical assistance -- The United States and other countries are supplying the developing countries many kinds of economic aid and technical assistance. For example, fertilizer, pesticides, and other agricultural inputs have been supplied developing countries under economic aid programs carried out by AID. Food aid has accounted for over 40 percent of all economic aid to developing countries granted by U.S. in recent years. Questions arise concerning the optimal mix.

of aids in the form of food, production inputs, and technical assistance to bring about agricultural development and economic growth in specific developing countries. There is need for analysis of the way food aid programs can be integrated more effectively with other aid programs and with economic development programs of countries that are helped. There also is need to decide how foreign currencies obtained by the United States from sales of farm products can be used to accelerate economic growth abroad and expand export markets.

- (2) Food needs for meeting nutrient requirements by countries -- In order to determine specific foods and the quality of foods needed in carrying out food aid programs it is necessary to know (a) individual nutritional requirements, and (b) actual food consumption and preparation practices. Data by country are lacking or of questionable quality for both of these items. There is lack of information about home grown, locally bartered and other nonpurchased foods. Food consumption data tend to be expressed as averages for whole countries or regions. This is an intolerable masking of the needs of the specific families or those vulnerable groups within families who, because of custom, age or health, do not get enough of the food that is available.
- (3) Expanding domestic production within developing countries versus expanding imports under food aid programs in meeting growing food needs -- In countries that traditionally experience starvation and malnutrition, there is no quick alternative to acquiring food from outside the country. To prevent starvation and malnutrition within the immediate future, their alternatives are (a) food purchases if foreign exchange is available or can be generated, (b) grants of food, (c) increased domestic food production, and (d) some combination of these alternatives. The food grant is a temporary measure. This alternative must be made subordinate to and complementary with increased domestic food production or increases of other products that generate foreign exchange for food purchases, or a combination of the two. There is need to determine food aid requirements for individual countries as they progress from current inadequate to adequate food supplies through a combination of grants, purchases and increased domestic production of food and other products for which they enjoy comparative advantages.
- (4) Efficiency in handling and distributing agricultural commodities in recipient countries -- Effective use of food aid depends upon adequacy of transportation, storage, processing and distribution facilities for handling agricultural commodities. Studies to appraise adequacy of present facilities and how they can be improved and financed are needed. Potentials for improving use of food under institutional food programs such as school lunches remain to be explored. We need to know the implications of food aid for population growth

and the quality of life. Does food aid merely keep more people alive to subsist at a starvation level? To what extent is population control needed to complement food aid in improving quality of life?

(5) Effects of food aid on agricultural production in recipient countries -- Agricultural commodities supplied under food aid programs may reduce prices for locally produced commodities unless additional market demand for food is created at the time the food aid becomes available. Economic analyses are needed on how food aid can contribute to economic development of agriculture in recipient countries. When food is granted, domestic production will continue to be inadequate initially--not because of the grants, but because of many factors in the recipient country. But eventually, as the people there realize that starvation and malnutrition are not inevitable, there comes a period of rising expectations and demands. The government of the recipient country is then faced with a nutritional, economic, and political problem that cannot be ignored.

(6) Effects of food aid on price inflation and trade of recipient countries -- Expansion in food supplies achieved through food aid can help stem price inflation that might disrupt industrial growth and overall economic development. Likewise, food aid can help expand the total volume of trade, as recipient countries can use scarce foreign exchange to import other items. How food aid can influence price inflation and trade expansion and thereby economic growth of recipient countries needs to be analyzed in detail for major recipient countries.

(7) Third country effects on trade -- Possibly, food aid imports supplied by the United States can substitute in the short-run for commodities that would have been imported from other countries. However, food aid may be a means of expanding total trade over the long-term. The effects of food aid on expanding total international trade in farm products over the long-term by contributing to economic growth of the low-income countries needs to be analyzed in detail.

(8) Effects on U.S. agriculture -- In recent years, food aid exports have accounted for production from 15 to 20 million acres, 5-6 percent of the total acreage harvested in the United States. If it were not for these exports, farm prices and incomes would be lower and total crop acreage and agricultural output would have to be reduced to maintain farm incomes and prices. The impacts of food aid on the U.S. agricultural economy, including the effects on farm income and prices, agricultural marketing, processing, and farm supply industries need to be assessed.

(9) Effects on U.S. agricultural trade -- A major objective of P.L. 480 is to expand commercial exports of U.S. agricultural products by encouraging economic growth abroad and by introducing U.S. commodities

into foreign markets. Many countries such as Japan, Israel, Spain, Greece, and Taiwan have shifted gradually to imports under commercial terms from imports under concessional sales programs. How food aid can help build larger commercial markets for U.S. farm exports, while encouraging food production and purchasing power in less-developed countries, needs to be analyzed.

(10) Self-help provisions of food aid agreements -- Much more information concerning problems of improving agricultural production and marketing in the developing countries and the steps these countries can take to overcome these problems is needed for use in planning and carrying out food aid agreements.

D. Relation to Research in Other Program Categories

Research in this category is closely related to work under RPA 601, Foreign Agricultural Trade, and RPA 603, Foreign Agricultural Development. It also is related to research on Farm Adjustment, Prices, and Income. In the category, Foreign Agricultural Trade, analyses are made of demand and supply of farm products in foreign countries that are needed as a basis for planning food aid programs. Similarly, this category includes analyses of monetary and financial conditions in foreign countries. Such analyses are needed in determining whether countries are eligible for food aid and, if so, under what terms. Research in the category, Foreign Agricultural Development, is concerned with problems of agricultural development abroad. Information concerning problems of accelerating agricultural progress in developing countries and measures countries are taking to accelerate agricultural improvements will be useful in planning and carrying out food aid programs.

E. Organization of Research

Research plans in this area need to be coordinated with program operations of the Agency for International Development and the Foreign Agricultural Service, USDA, which are responsible for food aid programs. Attention needs to be given to studies of food aid conducted by the Food and Agriculture Organization and other international agencies in planning research in this area. The USDA should provide more complete information concerning financial and monetary conditions of foreign countries for use in deciding whether countries are eligible for food aid and determining interest rates and other conditions. Existing arrangements between the USDA and SAES for research in this area need to be continued and strengthened.

FOREIGN AGRICULTURAL DEVELOPMENT, RPA 603

A. National Needs for Research

Economic development in less developed countries depends heavily on technical assistance from the more advanced countries. Development requires new techniques, diffusion of knowledge concerning them, and increasing amounts of capital.

In the early stages of economic development, the less developed countries have been able to borrow many techniques directly from the more advanced countries. As development proceeds, the transfer of techniques requires increasing adaptive efforts, and increasing effort to solve technical problems that are unique to the developing country. Agricultural techniques, particularly, are sensitive to such differences in environment. So, in agriculture, the developed countries eventually may contribute more effectively through supplying research scientists than through the direct transfer of results of research and development. At the management level, successful exploitation of a technological breakthrough may involve readjustments of the farm business, and of whole regions. Extensive economic research, analyzing and appraising alternative courses of action may be required to determine the optimum adjustments quickly and accurately.

If there were no deficit in the agricultural research effort within the developing countries there would be no need for U.S. assistance. So the number of U.S. scientists who might be put to work usefully in the developing countries can be judged by the size of this deficit. The U.S., with about 45 billion dollars annual production in agriculture has about 12,000 scientist-man-years in agricultural research. Twenty-six developing countries with over 50 billion dollars worth of farm production probably have less than half as many scientists as the U.S.

Assistance by the USDA and the state experiment stations need not cover all of the unfilled scientist-man-year needs of the less-developed countries. Private foundations of the United States are contributing substantially. Other developed countries, and international agencies, such as FAO also help to fill the gap. FAO has about 3,000 professional workers. In some cases, developing countries may be unwilling to accept as many scientists as could be useful, since the presence of many foreign technicians may give an impression of undue foreign influence.

In addition to work by scientists directly on the technological and economic problems of developing countries, studies of the economics of agricultural development are needed for improving the technical and capital assistance policies and programs of the U.S. and other countries.

B. Current Program

Only fragments of the U.S. scientific effort related to foreign technical assistance are represented by available SMY data. In FY 1968, USDA-ERS had 14 SMY's classified in this problem area. Of these, 13 were on projects financed by AID. In the previous year, ERS had 13 SMY's, and ARS had 21. For SAES, 3.6 SMY's were counted in FY 1967. Research grants and contracts financed by P.L. 480 funds account for a substantial, but undetermined number of SMY's not included in the foregoing figures. The reporting of SAES SMY apparently excludes large numbers of state workers abroad under contracts between AID and their home institutions. These latter arrangements generally are with the university of which the station is a part rather than with the station. Besides the institutional aspect, the research scientist abroad may be more teacher, advisor or administrator than researcher. During his foreign assignment, the worker abroad may not be a scientist under the SMY definition.

Research that may contribute to agricultural development in the poorer countries of the world may include all of the research problem areas defined for purposes of U.S. Long Range Research Planning. How the research effort should be allocated among such problem areas in any given country must be determined from that country's development needs. Any of the research in the physical and biological sciences currently underway in the U.S. is potentially applicable in developing countries, subject to the limits set by differences in environment. Most developing countries are already doing some research on their own problems.

Current social science studies in the U.S. include such issues as:

- (1) Historical relationships between income growth and trade in the developing countries. Special attention is given to the effects of income growth abroad on U.S. agricultural exports.
- (2) Research to close the gap between food needs and food production in developing countries. Yield-increasing production technologies such as fertilizers, new varieties, and farmer incentives are emphasized.
- (3) Factors in changes in agricultural productivity of developing countries.
- (4) Analysis of export demand for agricultural products of developing countries so that their development can be geared to market potentials.

C. Recommended Program

Research inputs in this program have been inadequate to support desired rates of agricultural growth in many less developed countries. Estimates of SMY's required for an effective program are:

	<u>FY-1966</u>	<u>FY-1972</u>	<u>FY-1977</u>
USDA	23	249	324
SAES	4	230	305
Total	27	479	629

The estimates indicated above include only the SMY's devoted to research on agricultural development problems. They do not include SMY's on technical assistance assignments or educational work that often has a research component.

Types of problems for which research is recommended are:

(1) Agricultural productivity (farm and forest research)

- (a) Soil and water: Develop systems of soil and water management and conservation that will permit efficient, sustained and profitable use of soil and water; studies in soil chemistry, physics, microbiology, methods of cultivation, irrigation, crop rotation, and soil-water-plant relationships; and investigations of fertilizers and effective ways of manufacturing and using them.
- (b) Crops: Through breeding and selection, develop crops with higher productive efficiency, better quality and resistance to diseases, insects, nematodes, heat, cold and drought. Determine effective use of chemicals to control weeds, stimulate root formation on cuttings, prevent preharvest fruit drop, thin blossoming, promote ripening, and produce better flavor and nutritive qualities; investigate the use of cultivation, competitive crops, pasturage, herbicides and other means of brush and weed control in cultivated crops, pastures and rangelands; and introduce and test promising foreign species for domestic use.
- (c) Livestock: Investigations in breeding, feeding, and nutrition to develop superior strains of meat animals with more rapid growth capacity, economy of gain, high fertility and quality of carcass; breeding of strains of dairy cattle that have longer periods of usefulness, higher production levels, and better adaptability to specific environment; develop sheep efficient in producing high quality meat and wool; and develop strains of chickens and turkeys that excel in egg and meat production. Studies on the effect of animal and poultry management, age and sex on quality of meat, milk, and poultry products, wool, and other animal fibers. Studies of physiological aspects of growth, reproduction, infertility and lactation as they effect the general economic usefulness of farm animals.

(d) Forest production: Research on the selection and breeding of trees of superior wood quality, growth rate, adaptability to adverse conditions, resistance to disease and insects; determining the physiological and anatomical effects of growth regulating substances on forest trees; determining the responses and changes relating to growth and reproduction of foreign trees; and evaluating the nutrient requirements of forest trees at all stages of development; improving reforestation, and the development of new and improved estimating techniques for timber volume and growth rate; developing techniques for forestry survey of timber resources; finding new uses for foreign woods.

(e) Animal and plant protection: Develop techniques for diagnosing diseases of animals, trees and plants; use of chemicals and biologics for combating diseases and parasites; determine the chemistry and physics of diseases and ways that infectious ones are transmitted; investigations of the biology and habits of harmful parasites; the effect of parasites on animals, trees and plants, their transmission and the development of effective treatment to eradicate or control them. Studies of the biology and habits of injurious or beneficial insects; studies to determine methods, including insecticides, for destroying, controlling or eradicating insects injurious to agricultural crops, forest, and livestock and for utilizing beneficial ones.

(f) Farm power and machinery: Determine the safe and efficient uses of farm power, labor, machines, structures and materials; on new and improved methods and equipment for tillage, planting, cultivation, protecting and harvesting of crops; new and improved methods and equipment for conditioning and preparing farm products for sale; on income producing uses of electrical energy on farms as power or as radiations that may benefit plants and animals; on designing farm structures and their arrangements for greater strength, effectiveness, economy and more livable dwellings.

(g) Farm and forest management: Determine optimum combinations of enterprises, and employment of labor, capital and other inputs to maximize incomes in the dynamic setting generated by evolving technology and changing markets for inputs and for products of agriculture and forestry.

(2) Distribution, processing and preservation

(a) Food: Research to increase physical and economic efficiency in the distribution of food supplies through space and time; studies of pricing processes and of the generation and dissemination of current market information about prices, stock and movement of commodities essential to efficient distribution; studies in food

technology relevant to problems of food processing and preservation unique to the particular physical, social and economic environments of individual countries; studies of marketing institutions, practices and related government regulations affecting the functioning of the food marketing system; and studies of short- and long-term capital needs and financial facilities of the marketing system

- (b) Fiber: Research to increase efficiency in processing and marketing of farm and forest fibers, and to bring about a more discriminating adjustment of output to market demand.
- (c) Industrial and forest products: Determine the markets for raw materials of farm or forest origin to keep distribution abreast of changing end-use requirements and technology; studies of processing techniques to enhance efficiency and versatility of the finished products from farm and forest raw materials.
- (d) Production inputs: Describe the economies of scale and economics of location of facilities for manufacturing such agricultural inputs as fertilizers, other agricultural chemicals, farm machinery, etc.; determine the choices between importation and domestic manufacture of agricultural inputs; studies to develop improved systems for integrating production, storage, processing and dissemination of high quality seeds, plant materials and breeding animals; planning studies to guide private and public investment in production facilities to minimize lags and other maladjustments between emerging needs and the provision of needed supplies.

(3) Human nutrition

- (a) Statistics: Development of accurate and complete systems for collecting census data and vital statistics; improved estimates of crop and livestock production; better information on nutritional status and needs of the population in each country; and more accurate data on food losses and nonfood areas.
- (b) Foods: New knowledge of food composition, especially foods grown in tropical areas; development of new and unconventional food sources and protein concentrates; fortification of cereal grains and other foods grown in developing countries with proteins or amino acids; and on methods for increasing animal protein supplies.
- (c) Nutritional requirements: Studies on the relationships of nutrition and nutritional deficiencies to mental health; studies of anemia and diarrhea in infants; nutritional requirements during pregnancy and lactation in women; and relationships of nutrition to infection and parasitic infestations.

(d) Factors affecting food consumption: Relationship of food consumption to income levels of the family; factors affecting acceptability of new and different foods and relationships to existing food habits and customs.

(4) Economic and social development

(a) Facilities: Determination of requirements for, and evaluating alternative means of providing, irrigation and drainage systems, transport in all forms, storage and processing, and utilities such as electricity, gas, drinking water and sanitation systems, and development of means for ensuring adequate maintenance, operation, and utilization of the services of such facilities.

(b) Services: Studies to develop and determine means of improving the performance of services such as extension education; statistical and market news reporting; research laboratories and experiment stations; crop and animal protection, control and grading; soil conservation; credit and financial institutions; and schools and hospitals.

(c) Tenure, taxation and agricultural labor: Study of existing institutions and formulation of alternatives which will provide incentives for farmers' developmental efforts, and improve the distribution of the gains from rising productivity.

(d) Agricultural adjustments: Research to evaluate the physical productivity of familiar inputs; to identify new and more productive inputs, and the proper proportioning of inputs according to their relative productivity and prices; to determine appropriate responses, in agriculture, to the agricultural policies of national governments and common market groups.

D. Relation to Other Research Programs

Research in this problem area may include any or all of the other research problem areas dealt with in the domestic research program. Some of the work in this problem area is closely related to RPA 601, Foreign Agricultural Trade, and RPA 602, Food Aid Research. Solutions to some domestic problems in the field of physical and biological sciences may only be found through studies in foreign environments. U.S. research done abroad results in highly effective communication between scientists abroad and those of the U.S., thus enhancing the effectiveness of domestic research.

E. Organization of Research

Organization for research in this problem area is directly related to the organization for domestic research because of the range of research problems to be dealt with. There must be added organizational provisions reflecting the "assistance" aspects, and the special characteristics of relationships among nations. Existing arrangements for sharing of responsibilities between SAES and USDA may continue to be used and strengthened or improved with continued experience. As direct support for foreign research grows under this program, the role of P.L. 480 and AID could be lessened, relatively, if not absolutely, although provisions for coordinating technical assistance to agriculture under this program with other aspects of U.S. foreign economic policies and programs would still be needed.

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